

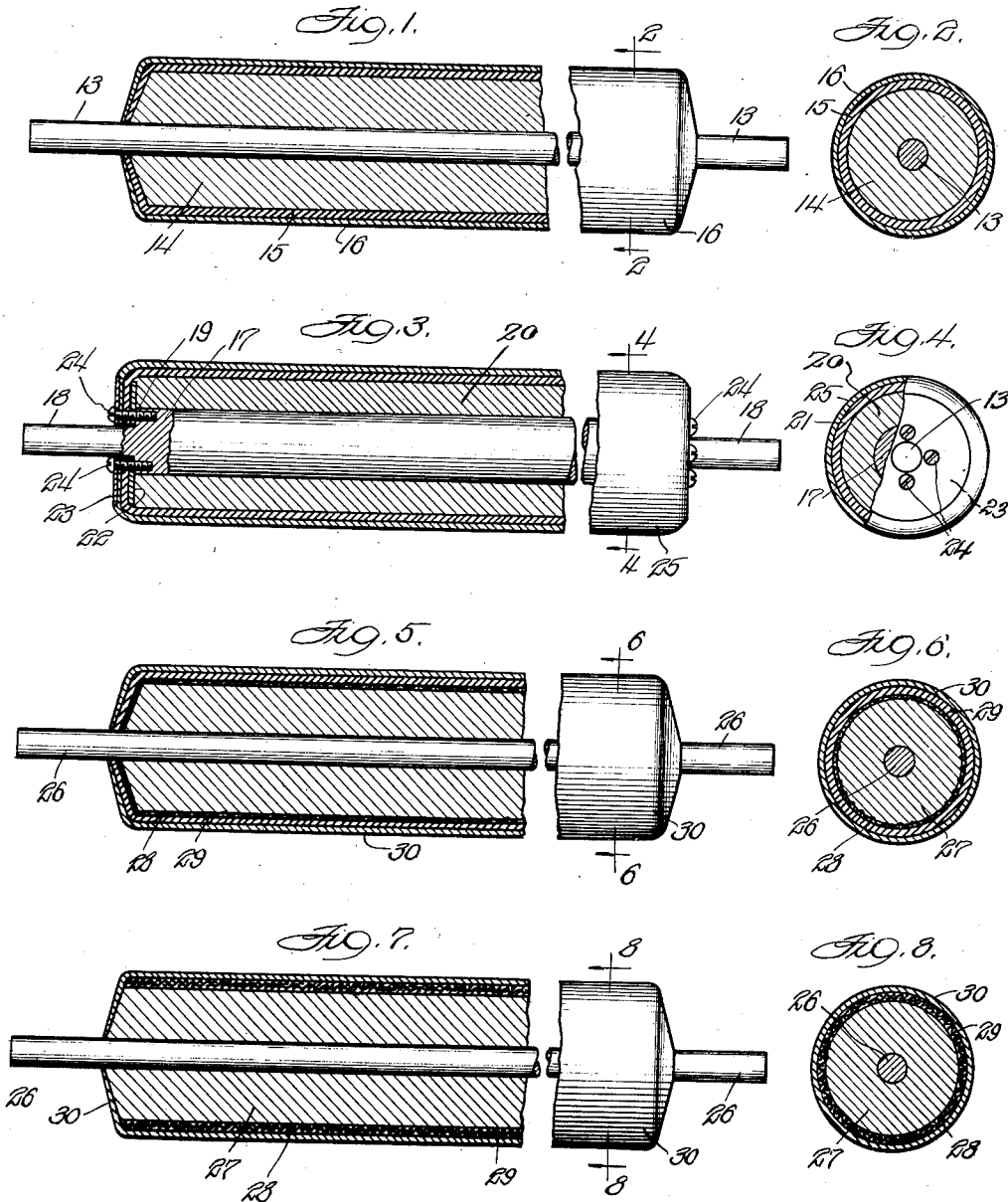
May 15, 1928.

O. LINDER

1,669,942

ROLLER

Filed April 10, 1924



Inventor:
OSCAR LINDER

By Jones, Addington, Ames & Leitch
attys.

UNITED STATES PATENT OFFICE.

OSCAR LINDER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE IDEAL ROLLER & MFG. CO.,
OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

ROLLER.

Application filed April 10, 1924. Serial No. 705,566.

This invention relates to rollers, and more particularly to inking rollers used on printing presses and similar appliances.

One of the objects of this invention resides in the procurement of a roller which has the best possible inking surface and which inking surface can be readily replaced or renewed when worn out, this replacement being accomplished with very little labor and expense. The inking surface of the improved roller in the improved construction is cushioned by a soft and resilient material, not widely different in consistency from that of the inking surface material, which latter material is strong and has lasting properties as compared to the inking surface and which, therefore, will be serviceable much longer than the actual inking surface, and will outlast a number of inking surfaces.

Another object of this invention resides in the building of a roller which is practically unaffected in dimensions or consistency by ordinary changes in temperature and humidity, and which is constructed of a material which will not melt when the roller is used during ordinary changes of atmospheric temperature and humidity.

While this invention is applicable to many different uses, it is here principally described as referring to inking rollers used on ordinary printing presses.

Most of the inking rollers, heretofore used, are constructed of a rigid core, which core is generally made of steel, wood or similar material. On this core is cast, or otherwise formed, a comparatively heavy cylindrical layer or covering of some roller material. In practical use, the surface of these rollers becomes worn or damaged, or otherwise unfit for further use within a comparatively short time. Rollers are damaged or made unfit for service in this manner in varying periods of time extending anywhere from one day to a period of several months. When a roller is damaged in this way, the entire roller covering becomes useless, and has to be stripped or melted off, and either discarded or refined, and an entire new covering must be cast or molded back upon the rigid core.

It will, consequently, be evident that the greater part of the covering of the roller core has no direct function in the roller construction, except to act as a cushion for the

inking surface of the roller. Furthermore, when the inking surface becomes defective and not suitable for further use, the complete covering of the roller must be removed and replaced, and this requires complicated and expensive equipment, and entails considerable delay and expense, even though only the surface of the roller has become unfit for further use, and the rest of the roller covering, constituting about 90% of the total covering, is still good for a long time.

Printers' rollers as constructed heretofore, have been made principally of three basic materials, namely—first, the ordinary and well known printer's roller composition, hereinafter called "composition", consisting principally of glue, glycerin and water; second, vulcanized oil, and third, vulcanized rubber. The advantages and disadvantages of these three different kinds of roller coverings will be briefly referred to in the following:

The printer's roller composition is ordinarily considered the best ink distributing medium. This composition can be made of any desired softness, by using the proper proportions of its ingredients. It has its disadvantages, however, as follows. In the first place, it is seasonable, that is, it is readily affected by changes in atmospheric temperature and humidity, principally due to the hygroscopicity of the glycerin, which results in hardening or softening and in shrinkage or expansion. This covering, furthermore, has the great disadvantage that it is likely to melt and burst on warm and humid days while the roller is in use. It also has the disadvantage that it cannot be trued on the rigid stock or core, if through faulty manufacture or through pressure, it is not concentric on the rigid core. It is generally recognized that the softest, most sticky ("tacky") and most resilient composition gives the best results in printing. Unfortunately, a roller composition which has as much softness and tackiness as desired, lacks resiliency, and exhibits all the disadvantages above recited, namely, it melts and runs readily in use, and it expands and contracts badly with changes in temperature and humidity. There are, therefore, certain limitations to the quality of composition which can be used, imposed by the requirements of modern printing presses

and practices, which prohibit the use of as soft a composition as desired, because such a composition would not last.

Vulcanized oil as a coating has the advantage that it can be produced in any desired consistency, and a roller made from vulcanized oil is practically unaffected by ordinary atmospheric changes in temperature and humidity as far as dimensions and consistency of the roller are concerned. Vulcanized oil of the desired softness, however, has the disadvantage that it is mechanically weak and is easily damaged in handling and in practical use. It also lacks the strength to withstand the abrasive and cutting action of the type, and, particularly, of the rules which are so frequently used in connection with type. It has another serious fault, namely, if made soft enough for the proper inking of type, it has a tendency to absorb the oils and vehicles of inks and cause them to thicken excessively and to dry too fast in the press during printing. It also has another serious disadvantage, since when made soft enough for inking type, it lacks the resiliency or life which is desired for a roller material. In other words, it is too dead and does not resume its original shape after deformation as quickly as required for roller material. Furthermore, it has the disadvantage that when soft enough for use in inking type, it cannot be ground or otherwise trued, without obtaining a rough surface which makes it unfit for use. It, therefore, must be molded in carefully made and expensive molds.

Rubber, as a roller covering, has the advantage that it is practically unaffected by ordinary changes in temperature and humidity, and further, that it is mechanically strong, tough and not readily injured. It has the serious disadvantage, however, that it absorbs oils from printing inks, and, thereby, becomes sticky and swells, so that when it is made of a consistency soft enough for use in inking type, it soon becomes useless. For this reason, rubber rollers have not been considered successful in the printing industry, except for a few special purposes, for which they could be made hard enough to withstand the effect of oils, by a proper compounding with inert materials and by a high degree of vulcanization. A printer's roller constructed in this manner, however, is not satisfactory for inking type except when used for the very coarsest kind of work.

It is the purpose of this invention to utilize a combination of all three of the materials cited in such a novel manner and under such novel conditions, that in this combination the undesirable characteristics of each of these materials are offset by the desirable characteristics of the other materials.

In this way, it is possible to obtain a better roller which is not only superior in quality, but also one which is much more easily and cheaply maintained than the ordinary printer's roller heretofore used in the commercial art.

For the purpose of illustration, preferred forms of the improved roller are shown in the accompanying drawings, in which—

Figure 1—is an illustration of the roller, partly in section, showing the manner in which the roller materials are combined and secured to the roller core;

Figure 2—is a section of the roller taken on the plane illustrated by the line 2—2 of Figure 1;

Figure 3—is an illustration of another form of roller, partly in section, showing the method of applying the various coatings to the roller core, and of securing the ends;

Figure 4—is partly an end view and partly a section taken on the plane illustrated by the line 4—4 of the roller illustrated in Figure 3—and

Figure 5—is an illustration of another form of roller, partly in section—and

Figure 6—a section of the roller taken on the plane represented by the lines 6—6 of Figure 5;

Figure 7—is an illustration of still another form of roller, partly in section—and

Figure 8—a section of the roller taken on the plane represented by the line 8—8 of Figure 7.

In the construction of the rollers, as shown in the drawings, the vulcanized oil is used as a cushion on the rigid core, and this cushion is covered with a thin rubber covering, which, in turn, is covered with a thin surface coating of printer's roller composition. Thus, as illustrated in Figures 1 and 2, the rigid core, or stock 13, of the roller has applied thereto a vulcanized oil cushion 14, to which is applied a rubber covering 15, and upon which is placed the composition coating 16.

In Figures 3 and 4, the construction of the roller is somewhat different. In this instance, the rigid core 17 is smaller in diameter at the spindles 18, thus forming the shoulders 19, which are utilized for securing the ends of the rubber covering of the roller. The vulcanized oil coating 20 is secured to the core 17, over which is placed the rubber covering 21. Secured to the shoulder 19 of the rigid core, and contacting with the end of the rubber covering 21, are rigid discs 22 and 23, which are secured to the core 17, by means of screws such as 24, or any other suitable fastening means. The composition covering 25 is placed over the rubber coating 21 and together with the plates 23, encloses the rubber coating. If desired, the composition

tion covering 25 can be extended to cover the plates 23. It is sometimes also desirable to coat the plates 23 with a composition such as vulcanized oil and to so bevel it that the ends of the roller take the form shown in Figure 1, thereby avoiding the presence of sharp corners which have been found to be undesirable in the application of the coating 25.

10 The construction of the roller shown in Figures 5 and 6 is similar to that shown in Figures 1 and 2, except that a fabric reinforcement is used. The rigid core 26 is covered with vulcanized oil 27. Around this, the fabric reinforcement shown by the dotted lines 28 is wrapped, and to this is secured or bonded, the rubber covering 29, which, in turn is coated by the composition coating 30.

20 In Figures 7 and 8, the construction is similar to that shown in Figures 5 and 6, and like numbers are used to designate like objects, as in Figures 5 and 6. The difference is that the fabric reinforcement in Figures 7 and 8 is embedded in the rubber, and that neither rubber nor fabric are brought around the shoulders of the roller to the rigid stock but terminate at the shoulders of the vulcanized oil covering.

30 A roller constructed according to the teachings of this invention is equipped with the best possible inking surface, namely, the composition surfaces 16, 25 and 30, of the rollers illustrated in the drawings. The roller is equipped with a cushion, namely, the vulcanized oil coatings 14, 20 and 27, which has the desired softness and which is practically unaffected in dimensions or consistency by ordinary changes in temperature and humidity, and which will not melt or burst when the roller is in use. The roller is equipped with a covering 15, 21 and 29, of rubber which is mechanically strong and has tough and lasting characteristics and by using a fabric reinforcement such as 28 between the vulcanized oil and the rubber, or embedded in the rubber, the strength of the roller can be further increased.

By utilizing these different materials in this manner, and by adjusting the properties of the material used in each coating, to suit its particular purpose, a roller of any desired consistency may be obtained and such a roller can be made soft enough for all printing purposes, yet strong enough to withstand ordinary usage.

50 The roller of this invention approaches very closely the pneumatic printer's roller. A pneumatic or air cushioned roller has almost from the beginning of the printing art, been considered the most desirable roller, if it could be produced practically. A good many such rollers have been designed, but none ever became of any commercial value because of the impractical-

bility of confining compressed air within definite limits, and in a definite shape, particularly, in cylindrical form. In the roller of this invention, the vulcanized oil takes the place of compressed air, has substantially the same cushioning effect as compressed air, and still can be molded or formed in definite shape and confined and kept for an indefinite time, within this shape, and within definite and fixed dimensions. Furthermore, by varying the degree of vulcanization, its softness and resiliency can be made to equal that of compressed air at almost any pressure.

Heretofore, in making cushions of very soft materials, such as very soft glue composition, or vulcanized oil, it has been found that the resulting cushion, while soft, lacks resilience or life. The material in that stage is generally called dead or sluggish, and while it withstands deformation and eventually resumes its original shape, the come-back is slow and sluggish, and lacks the snap and quickness which characterizes well-cured rubber, compressed air, or similar examples of good resiliency. I have discovered, that if such comparatively dead materials are subjected to slight pressure, the resiliency or life increases with the pressure. It only needs little pressure to effect this result, and even the small amount of pressure exerted, for example, by stretching a rubber tube over a dead cushion, will have the result of increasing the resiliency of life of the cushion to a considerable extent. In making use of this discovery, I can use a cushion of vulcanized oil, which is comparatively dead, and stretch on it the rubber covering, using such a stretch that the resulting rubber covered cushion has all the desired resilience. While, therefore, vulcanized oil of very soft consistency is quite dead and lacks the desired resilience and quick comeback, if sufficiently soft for use in an inking roller, this expedient of confining it within a rubber tube and under tension or pressure in the tube, provides a cushion of great softness and resiliency, which it has not been possible to obtain heretofore. The same applies, if very soft glue composition or sponge roller is used for a cushion, in place of vulcanized oil, when a similar increase in life or resiliency is noted by the same expedient.

Evidently, the rubber tube may be either vulcanized and formed first, and then stretched on the vulcanized oil, or it may be formed and vulcanized on the cushion directly. In the latter case, the shrinkage of the rubber, due to and during the vulcanization, will frequently be sufficient to exert the necessarily permanent pressure, particularly, if a rubber compound is used, which is subject to considerable shrinkage during vulcanization, and if the wrapping process

is carried out with this object in view. When stretching a rubber tube over the vulcanized oil, I generally prefer a circumferential stretch of about 10%, that is, the tubing rests on the vulcanized oil so that its circumference is 10% longer than when unstretched.

The use of vulcanized oil gives a soft cushioning feature and the disadvantages of the vulcanized oil, which have been referred to hereinbefore, are offset by the rubber coating which makes the rollers strong, durable, resilient, and eliminates the weak characteristics of soft vulcanized oil rollers, but retains in the roller the desired softness. Instead of the rubber covering, or, in addition thereto, one or more windings or layers of flexible fabric may be used, such as cotton, wool, silk, or cord, either between the different coverings, or embedded in the rubber, or both. When such fabrics are used, it is necessary that they be of such a character, and that they are utilized in such a manner so as to obtain the desired stretch so as to procure the necessary compression of the roller cushion material.

The composition coating of the roller can be very readily replaced with little expense or delay and with comparatively simple equipment. When this composition coating is removed, the bulk of the roller, that is, the roller consisting of the core and the vulcanized oil and rubber coating, has been subjected to practically no wear and are substantially in the same condition as when the roller was originally constructed, and these first two coverings, therefore, do not have to be replaced or renewed except at very long intervals. In accordance with the teachings of this invention a covering of ordinary roller composition, such as, for example, the well known glue composition, consisting of glue, glycerin and water, or any of its modifications, is applied as a surfacing or coating of the kind described in United States Patent No. 1,404,209. This surface covering need not be thick, and it is generally preferable to make it less than $\frac{1}{8}$ of an inch thick. Ordinarily, the coating may be best applied by flooding the composition in a melted condition on the roller cushion, or it may be poured, brushed, sprayed or otherwise applied to the surface of the cushion, in a comparatively thin layer, or in a plurality of layers, without the use of a mold. This invention, however, is not restricted to the use of a coating process, as just described, and any means for applying this coating to form the surface layer is included within its scope. The composition may be used in diluted condition, and after it is applied it may be permitted to dry out. In applying the surface coating, it is sometimes advantageous to heat the cushion in order to get a more perfect ad-

hesion between the coatings. Likewise, it is sometimes preferable to slightly roughen the exterior surface of the rubber covering to obtain a better adhesion between the coatings.

When a roller constructed according to the teachings of this invention and as illustrated in the drawings has been used to the extent that its surface becomes worn, in which condition it is no longer fit for use, the composition covering is simply removed or washed off with hot or cold water, or removed in any other way known in the art. A new coating or surface of the printer's roller composition may then be placed on the roller at very little expense.

With this roller, therefore, it is simply necessary to renew the surface coating when it becomes worn or deteriorates for any purpose, while the main body of the roller covering is undisturbed and can be used indefinitely, as compared to the length of time that the surface coating can be used. Even when the main body of the roller becomes slightly damaged, it can be frequently repaired and its life further extended. The body of the roller with its vulcanized oil cushion and rubber coating is of a character that it can stand any molding operation, as well as any other operation, for removing the outer coating such as washing off with steam, hot or cold water.

Further, since the rubber covering is protected by the surface layer of glue composition, the oils in the printing inks and the cleaning fluids do not reach the rubber covering and cannot reach it until the composition surface is damaged, at which time the outer covering must be removed and a new one placed upon the rubber coating. In order to avoid or lessen the effect of accidental injuries to the rubber covering through inks, the rubber may be treated or coated with suitable oil resisting substances, such as flexible varnishes, lacquers, etc., and preferably a grade of rubber should be used which is least affected by oils and inks.

Since the roller which is constructed with a vulcanized oil cushion to which has been applied a covering of vulcanized rubber is to all practical purposes immune to changes in dimensions and consistency within ordinary variations in temperature and humidity in practical operation, even though the rubber covering may have been damaged, it must be understood that the thin surface coating of glue composition, which in itself is subject to such changes, has very little influence on the total changes of dimensions and consistency of the completed or surfaced roller. For this reason, a roller made in accordance with the teachings of this invention can be considered, for all practical purposes, to be devoid of shrinkage, expansion, hardening or softening. Rollers of this

character, therefore, do not have to be reset, when once properly set in the press.

A roller built, according to the teachings of this invention, owing to the thin surface layer of composition, is practically immune from melting in use, although the composition coating itself may be meltable. It is well known to those skilled in the art that composition rollers melt on the inside, not at the surface. If desired, however, the thin coating of composition may be chemically treated to the effect that it becomes unmeltable.

In the practical operation of constructing these rollers it is preferable to grind the rubber covering after the cushion is in place, so that the working surface is true with respect to the journals of the cores, and this grinding also gives a slightly rough surface so that the composition coating adheres well.

In order to have the best permanent adhesion between the composition coating and the cushion, it is necessary to make the consistency of the cushion as nearly as possible the same as that of the composition coating. Unless this is the case the surface covering of composition may not adhere permanently to the cushion or may crack.

Obviously, this invention is not limited to the specific form thereof herein illustrated and described but is subject to many variations and other applications, the scope of the invention being set forth in the appended claims.

Having thus described my invention, what I claim is new and desire to secure by Letters Patent of the United States is:

1. A printer's roller which consists of a rigid core, a main body of vulcanized oil, a covering of rubber, and a renewable surface coating of composition.

2. A printer's roller which consists of a rigid core, a covering of vulcanized oil vulcanized to said core, a covering of rubber bonded to said vulcanized oil, and a surface coating of composition, said composition coating being removable and replaceable without affecting the other two coatings.

3. A printer's roller consisting of a rigid core, a cushion secured to said core which is not substantially affected in dimensions and consistency by ordinary changes of temperature and humidity, a rubber covering for said cushion adapted to strengthen said cushion, and an easily removable and replaceable coating adapted for distributing ink applied to said strengthened cover.

4. In a roller, in combination with a rigid core, a soft cushioning material secured to said core, means for rendering said material resilient by confining the coating under pressure, and a surface coating of composition, said composition coating being removable and replaceable without affecting the other two coatings.

5. In a roller, in combination with a rigid core, a soft cushion secured to said core, a stretched rubber tube placed over said cushion whereby said cushion is rendered resilient due to the pressure exerted by said rubber tube, and a surface coating of composition, said composition coating being removable and replaceable without affecting the other two coatings.

6. In a roller, in combination with a rigid core, a soft cushion covering secured to said core, a rubber tube stretched over said cushion and exerting pressure upon said cushion, and a renewable inking surface secured to said rubber tube by its own adhesiveness.

7. In a roller, in combination with a rigid core, a soft cushion coating of vulcanized oil secured to said core, a rubber tube enclosing said cushion and stretched over said cushion to subject said cushion to pressure, end washers secured to said core, said washers and said tube completely enclosing said vulcanizing oil cushion, and a renewable surface of composition secured to said rubber tube.

8. A roller, in combination with a rigid core, a layer of vulcanized oil secured to said core, a rubber tube stretched over said vulcanized oil whereby said coating of vulcanized oil is placed under pressure and forms a resilient cushion for the roller, an easily renewable surface coating of composition of substantially the same resilience as the cushion secured to the rubber tube and adhering to said rubber tube by its own adhesiveness.

9. A roller, in combination with a rigid core, a cushion of vulcanized oil secured to said core, means enclosing said cushion to place it under compression and to give the cushion the desired resilience, and a renewable and removable working surface secured to said means, which surface has substantially the same resilience as the vulcanized oil cushion.

In witness whereof, I have hereunto subscribed my name.

OSCAR LINDER.